

THE EFFECTS OF GRADUATED EXPOSURE, MODELING AND
CONTINGENT SOCIAL ATTENTION ON TOLERANCE TO SKIN CARE
PRODUCTS WITH CHILDREN WITH AUTISM

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The effects of graduated exposure, modeling and contingent social attention on tolerance to skincare products were evaluated with two boys with autism who displayed tactile defensiveness. Upon each presentation step of skincare products the number of positive and negative responses and successful step completion were measured. Procedures included modeling, presenting graduated opportunities, and providing social attention for step completion. Step advancement occurred if a child engaged in a step independently, without excessive refusals. A changing criterion design and a multiple baseline were employed to evaluate effects of this treatment package. Children demonstrated more positive and fewer negative responses as they completed the graduated steps. Effects maintained in follow-up observations.

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INTRODUCTION

Although childhood fears are a part of normal development they have the potential to interfere with daily functioning (King & Ollendick, 1997). When children with mental retardation and other developmental disabilities, including autism, display fearful responses it often appears to interfere directly with adaptive functioning (Matson, 1981). Avoidance behaviors, such as screaming, crying, and running away are some of the behaviors that are included in definitions of fearful or avoidance responding. These behaviors can affect the child in many different ways. For example, consider the case of a teacher attempting to put suntan lotion on a child before going on a summer field trip. A child with autism, who has severe avoidance responses to lotion, may begin to scream, kick the teacher and run away. This could be problematic in that the child will get sunburned, call unnecessary attention to himself, and may not be able to go on the field trip.

An unusual responsiveness to the sensory environment is one of the behavioral characteristics of children with autism (American Psychiatric Association, 1994). For example, children may display extreme distress at going barefoot, it may bother them to have their face touched, they may become upset if their hands get dirty, or show distress if someone applies cream to any body part. This class of unusual responding is referred to as tactile defensiveness (TD) (Baranek & Berkson, 1994; Case-Smith, 1991; Royeen, 1986).

TD refers to observable adverse responses to certain types of tactile stimuli that most people would find tolerable (Royeen & Lane, 1991). Royeen (1986) compiled a list of descriptors associated with TD in elementary school children. The author's definition of TD included an "aversive reaction to touch manifested in atypical psychological or motor behavior" (p. 697). Examples included, "After someone touches me, I feel like rubbing that spot", "Getting dirty bothers me", and "Finger painting bothers me". Investigators have identified specific behavioral responses such as scratching/rubbing the skin, negative facial grimaces and flight from the stimulus (Baranek & Berkson, 1994) as components of TD.

Theoretical explanations of TD rely on the physiological concept of inhibition (Ayres, 1964; Baranek & Berkson, 1994). Ayres (1964) describes TD as a result of two somatosensory systems that are out of balance. As a result, exaggerated movements, negative affect, and diminished temporal and special awareness are observed. A more popular view of TD focuses on the supposedly defective inhibitory mechanisms within the central nervous system. Larson (1982) suggested "an imbalance in descending mechanisms, which would result in either too little or too much inhibition." Finally, Fisher and Dunn (1983) reviewed general theories of pain mechanisms and hypothesized that "tactile input may be regulated at the level of the spinal cord by inhibitory influences from higher centers. In the case of TD, this modulation (inhibition) may be deficient, causing an overreaction to tactile stimuli." Whatever physiological anomalies may be involved, it is clear that TD is a behavioral problem and effective treatment options are desirable.

A Socially Significant Problem

Quite often the parents of children with autism and TD report that their children will not allow the application of certain products to their skin (Hatch-Rasmussen, 1995). If the parent persists, the children become extremely upset. This is of concern for several reasons. If a child has a cut, parents are not able to apply an antibiotic cream. If a child has eczema, parents are not able to apply lotion. If a child is at school and the kids are making mud pies, the child will be unlikely to participate. More often than not, children with autism behave very differently from their peers and are avoided by other children. In addition to health considerations unusual reactions can interfere with socialization. Love, Matson, & West (1990) reported that mothers stated that improvements in their child's phobic behavior eliminated a major impediment to their child's overall adjustment.

Children with TD often are excluded from new learning opportunities due to avoidance responding to stimuli. The ability to tolerate tactile stimuli could be considered a behavioral cusp. A cusp is simply a change in behavior that has consequences for the child that go beyond that change itself. It can reveal new environments as well as new reinforcers and communities to the child (Rosales-Ruiz & Baer, 1997). Being able to wear sunscreen or tolerate dirty hands can make new environments available to the child, thereby providing the opportunity to develop new skills and reinforcers such as outdoor swimming, going on field trips, bike riding, or making mud pies with friends. Acceptance of new tactile stimuli can quite possibly bring the child's behavior into contact with new contingencies that have even more far-reaching consequences. For example, if a child is able to wear sunscreen he is more likely to accept invitations to swimming parties.

Attendance at swimming parties could increase the likelihood that swimming skills will advance. Social interactions will increase; new water play activities will come to function as reinforcers, etc. TD in children with autism appears to fit the definition of a socially significant problem (Baer, Wolf, & Risley, 1968) worthy of attention.

Treatment Alternatives

There are a limited number of studies that directly address TD in children with autism. There are, however, related investigations with other populations. Treatments have generally involved systematic desensitization, modeling, or flooding. Two of those procedures, systematic desensitization and modeling will be reviewed here.

A common counterconditioning procedure used with children is *in vivo* desensitization (Morris & Kratochwill, 1998). Counterconditioning is extinguishing one response while simultaneously training a new response that is incompatible with the one to be extinguished (Martin & Pear, 1992). Two treatment protocols based on the early writings of Pavlov, Watson, Jones, and Masserman were *in vivo* and systematic desensitization (SD). In this paradigm, fears and phobias are viewed as classically conditioned responses that can be unlearned. The child with autism, displaying fearful inappropriate responses when his parents try to apply suntan lotion, can be taught a new set of responses that may replace the less appropriate responses.

SD typically consists of three components: induction of relaxation, development of a fear-producing stimulus hierarchy, and the systematic, graduated pairing of items in the hierarchy with relaxation (King & Ollendick, 1997; Martin & Pear, 1992; Luscre and Center, 1996; Sturges & Sturges, 1998). Generally, the fear-producing stimuli are

presented verbally and gradually, in order of least to most fear producing. The difference between *in vivo* and systematic desensitization is *in vivo* does not always use relaxation training and the anxiety-producing stimuli are presented in vivo (Morris & Kratochwill, 1998). For the purpose of this research, the development of a fear producing *in vivo* stimulus hierarchy and the graduated exposure to the steps in the hierarchy were deemed most appropriate. Formal “relaxation” training was not used in this research because the experimenter considered it inappropriate for the children involved. Training relaxation is complicated and the children did not have the prerequisite skills necessary.

Modeling is another method that has been used frequently and productively in the treatment of children and adolescents who exhibit unusual anxiety and fear (King & Ollendick, 1997). Essentially, modeling entails demonstrating non-fearful behavior in the anxiety-provoking situation and showing the child an appropriate response to presentations of the feared stimuli. Modeling capitalizes on the process of observational learning, just seeing someone performing, demonstrating, or modeling behavior is sufficient to prompt its imitation (Sulzer-Azaroff & Mayer, 1991). Although the ability to imitate is a common deficit in many children with autism (Miller, 1997) it is almost always an early goal of most intervention programs (Rappaport, 1996; Taylor & McDonough, 1996). Because of this, many children with autism who have been in treatment have acquired the skill of learning through observation. Therefore, modeling can be a useful technique with children in later stages of treatment programs (Davis & Russell, 1990).

It must be emphasized that many factors should be considered to ensure the optimal use of modeling with these children. For example, attention must be given to the characteristics of the model (Martin & Pear, 1992). It is not always necessary that the child respond (Ellis-Weismer & Murray-Branch, 1989). As with desensitization and its variants, modeling-based procedures have received empirical support for their utility (King & Ollendick, 1997). Some evidence suggests that modeling is in itself a critical component. As noted by O'Leary and Carr (1982) and Ollendick (1979), most of these studies have been with children displaying fairly mild fears and anxieties. It is important to reinforce the modeled behavior (Sulzer-Azaroff & Mayer, 1991). Reinforcing the modeled performance has been found to increase imitation (Bandura & Kupers, 1964; Bandura, Ross & Ross, 1963a: 1963b).

Two of the studies that have addressed children with autism and TD will be discussed here. Love et al. (1990) conducted a study with two children with autism with specific avoidance behaviors. One child avoided going outside and the other avoided running water in the bathroom. Children were gradually exposed to fearful situations with the mothers serving as therapists. Both children completed the hierarchy in less than 23 steps, and in less than 36 sessions. Fearful responses remained low (one or fewer per session) at 5 month and one-year follow-ups.

Another study conducted by Luscre and Center (1996) reduced fearful responses in three male children with autism, between the ages of 6 and 10, who exhibited fearful responses (described as aggression, persistent vocal resistance, and escape behaviors) during dental exams. The study involved a combined desensitization with guided

mastery, video peer modeling and reinforcement treatment package. The experimenters began treatment in an analog dental setting using videotapes. The investigator encouraged the children verbally, and through physical assistance to accept the dental procedures modeled in the video. Following successful completion of each treated step, the investigator dispensed individual reinforcement. A multiple baseline demonstrated that the children were taught to cooperate during the upsetting experience, a dental exam.

The purpose of the present study was to evaluate the effects of a treatment package. The package included three components; graduated exposure to steps in an avoidance hierarchy, modeling and social attention (praise, hugs, smiles, tickles, etc.) delivered contingent on step completion. The behavior of interest was the acceptance and avoidance of, or intolerance to skin care products by two young children with autism.

METHOD

Participants

The experimenter was a graduate student in behavior analysis at the University of North Texas with ten years experience working with children with and without special needs, a majority of that experience being with children with autism. One of the children's mother was also a participant. She functioned as a change agent. During each condition of the experiment, she implemented generalization probes.

An independent diagnostician evaluated both children who participated in the study using the Childhood Autism Rating Scale (CARS) (Schopler, Reichler, DeVellis & Daly, 1980). Participants volunteered participation through North Texas Autism Project (NTAP) and Families for Early Autism Treatment-North Texas (FEAT-NT) (see Appendix A). Parents reported their children displayed intolerance to skin care products. Informed consent was obtained from the parents of each participant (see Appendix B). The treatment package for Child 1 was a part of his early intervention program. The results of this treatment led the experimenter to further analyze the effectiveness of such a treatment with Child 2. Child 1's intervention preceded Child 2's intervention by 3 years. Pseudonyms have been used for both children to protect confidentiality.

Child 1. Duke was a 4-year old boy with autism who had a CARS score in the mild to moderate range (33 ½) and also diagnosed as having a "severe language disorder". He displayed intolerance to skin lotion. His mother reported that he needed to use lotion to prevent severe dry skin. She usually attempted to apply lotion after his bath

in the evening. She reported, and the experimenter observed, that he hit, screamed, cried, hid his hands behind his back, and pushed away the bottle and the person holding the bottle. His face contorted into a grimace. He whined “No, I don’t want it” and other similar responses in a tone that was usually a precursor to crying.

Child 2. Sam was a 4-year old boy with autism, who had a CARS score in the moderate to severe range (37). He displayed intolerance to three skin care products. These products consisted of suntan lotion, antibiotic cream, and baby lotion. His mother reported, and the experimenter observed, that he cried and screamed and struggled to get away from the person who had the products. He pulled his arms or legs away if anyone tried to apply any of these products to him. He also whined while he said “no, no lotion”, “I don’t want it”, or other similar responses, that were usually accompanied by crying. Sam’s mother also participated in the study.

Settings and Materials

All sessions were conducted in the child’s home, starting in a room with toys and eventually in other areas of the home. A video camera was used to record sessions for both participants. Sessions lasted between 30 and 60 minutes. Materials included products to which the children displayed discomfort and a variety of games and toys.

Duke. Skin lotion was the targeted product. The treatment room was a playroom, which contained toys, posters, shelves, and a child-sized table with 2 child-sized chairs, one window and two doors. The room used for assessing generalization was the upstairs bathroom. This room contained a bathtub with shower, a toilet and sink, a stool, and several children’s books on the floor.

Sam. The targeted products consisted of suntan lotion, antibiotic cream, and baby lotion. The primary treatment setting was his bedroom, which contained his bed, a dresser, a TV, several toys, shelves, a child-sized table with 2 child-sized chairs, one window and two doors. The areas used to assess generalization included the area around an inflatable outdoor pool, two of his preschool classrooms, and his family's living room.

Dependent Variables

Duke. From videotaped recordings, the experimenter recorded the frequency of the following responses: verbal protests, whines, and facial grimaces. (Appendix C contains the full observation protocols and data sheets.) Verbal protests included words spoken by the child that conveyed dislike/discomfort, for example, saying, "Stop it" or "This feels icky". Whines included noises that were neither full cries nor normal speech tone, and facial grimaces included facial contortions such as nostrils flared, and eyebrows scrunched down.

Sam. As with Duke, data were collected on negative responses. Additionally, positive responses were recorded. The experimenter recorded the frequency of the following responses: positive and negative verbal responses, positive and negative vocal responses, positive and negative facial responses, and positive and negative physical responses. Positive verbal responses included, "I want lotion", or "Put on tummy". Positive vocal responses included the child laughing, and positive facial responses included smiling. Negative physical responses included the child pushing away the person or bottle of lotion and positive physical responses included the child picking up the bottle, or applying lotion to his body. Each occurrence of a response was recorded by

placing tick marks in the appropriate boxes on the observation form. Only the responses that were contextually related to the treatment procedure were recorded. For example, if during the session, the child was playing with a car and pushed it away and it crashed into the wall and he screamed “Help”, that was not counted as contextually related to treatment. On the other hand, if the child threw the bottle of lotion and screamed “Help” that was counted as one negative physical response and one negative vocal and one negative verbal response.

For both children, the experimenter also recorded each step of the exposure hierarchy that were completed or attempted but not completed. The steps for both children are included in Appendix D. The experimenter reviewed videotapes of sessions and recorded frequency of responses.

Interobserver agreement (IOA) was assessed by the experimenter and another graduate student for Sam. No IOA was assessed for Duke. During training of the other graduate student, the written behavioral definitions and exclusions were reviewed. Appendix C contains the observation code and data sheets. Sample sessions were viewed together with the experimenter verbally identifying the behaviors to be recorded. Then, the experimenter and the independent observer scored practice videotapes together until their scores showed at least 90% agreement for three consecutive steps that the child attempted. When proficiency was achieved, both experimenter and observer recorded data simultaneously from footage of treatment steps. The observations were recorded independently. That is observers did not compare tally marks or view one another’s recordings.

Reliability of the scoring procedures was determined by calculating the percent agreement between two scorers. Percentage agreement was calculated by dividing the number of agreed criteria met by the total number of criteria available per sample and multiplied by 100. This method of assessing interobserver agreement was used during baseline and treatment conditions.

Social validity was measured with a questionnaire (see Appendix E) (Poling, Methot, & LeSage, 1995). The parents of both children were asked to rate the importance of the goal and method of this treatment package, using a five point Likert scale. The parents were also asked to rate their satisfaction of the method and outcome of this study, from one to five. Finally, the questionnaire also included three open-ended questions. The first two regarded the significance of the outcomes for their family and for their child, and the third question requested suggestions for improvement of the intervention program.

Independent Variables

The three independent variables were graduated exposure *in vivo* to skin care products, modeling of appropriate responses to these products and social attention (praise, tickles, etc.) contingent on step completion. During graduated exposure, the experimenter exposed each child to small increments of the targeted stimuli. For example, step one for Sam was to sit near the bottle of lotion. When he demonstrated proficiency, he progressed to holding the bottle, wiping lotion off hand, and so on, until he was able to tolerate application of the lotion to his skin. The experimenter provided

praise, paired with events previously identified as high preference (periodically using informal preference assessments) for every attempt of a trial for both children.

During modeling, the experimenter demonstrated appropriate verbalizations and/or actions that typically accompany the use of the targeted stimuli or a combination of both. A verbal model included spoken words like “Oh my gosh, that’s a lot” or “Hey look, it’s all gone”. A physical model included physical movements like rubbing in lotion. A combination of both included rubbing lotion while the experimenter said “Hey it disappeared”. Modeling was used if the child failed to respond to the stimuli in a manner similar to typical peer responses. No model was delivered if the child was already responding appropriately.

Duke. The experimenter started the exposure with the child holding the bottle of lotion and the experimenter modeling a verbal response “Oh, look. There’s a flower on it”. The child then progressed to getting closer to the lotion itself; having it on his hand; rubbing in the lotion with the experimenter providing a physical model; and eventually accepting lotion in a typical manner. Criterion was to answer “yes” when asked, “Do you want some (product)?” and then tolerating application of that product, regardless of the environment.

Sam. Exposure began in a similar manner as Duke’s. First, the bottle was brought in close proximity to the child, then the products were manipulated with the experimenter’s hand without having to touch it himself, and so on, until he was able to tolerate the products while responding in a non-fearful manner.

Experimental Design

For both children, the design employed was changing criterion design. For Duke, only one skin care product was targeted and evaluated within the changing criterion design. For Sam, three skin care products were targeted and evaluated within a multiple baseline design.

Experimental Conditions.

During baseline, (the “pretest” phase), all targeted stimuli were presented for each child. After repeated failure to complete the criterion step, the treatment began for one of the targeted stimuli. Responses to remaining products were probed about halfway through treatment of the targeted products. During the treatment phase, the child was exposed to the targeted stimuli in a graduated breakdown of steps that followed a logical progression of steps leading to the criterion conditions. Appendix D shows a hierarchy of steps for each child. Appendix F shows an example of a typical training session. During post treatment, the experimenter presented the criterion step to the child. Post treatment was conducted to test for lasting treatment changes.

Generalization was assessed throughout treatment for Sam. His mother participated in baseline (or pretreatment) and post treatment (or follow-up). Furthermore, she conducted at least six trials during treatment. She conducted baseline and post treatment in the same manner as the experimenter.

Duke. The product for Duke was lotion for dry skin. The procedure included graduated exposure, modeling and contingent attention, as described earlier. A token system that was employed during his home treatment program was also used during the step procedure. Visual prompts were used to indicate how many trials were to be

completed. For instance, if the experimenter wanted to present five trials, she put out five blocks and a truck. Following each trial, the child put a block in a truck and when all the blocks were gone, he could go play. The experimenter put out ten pieces of granola bar and after each trial the child ate one. When they were all gone, he could go play. This was a standard method for this child during his daily therapy sessions that proved to be effective as well as enjoyable for the child.

After each presentation, Duke received some form of social attention (praise, smiles, tickles, etc.). The child was never forced to complete a step. If two or more types of negative responses occurred, the experimenter stopped and presented an “easier” step. If only one type of negative response occurred the experimenter remained on that step. If no negative responses occurred, then the experimenter moved on to the next step in the hierarchy. At times, the experimenter remained on a step for two or three more sessions if that step was particularly difficult or qualitatively different from the previous step, or if the previous step had produced a lot negative responding. Throughout all sessions, the experimenter made every attempt to make sessions fun for the child.

Sam. The products for Sam were suntan lotion, antibiotic cream, and baby lotion. Similar to Duke, the procedure included graduated exposure, modeling and contingent attention. Following baseline, the training phase was introduced on one product at a time. Since Sam had three target stimuli, probes for the remaining products were conducted periodically, with both the experimenter as well as the mother. When products were tolerated in an appropriate manner for the targeted stimulus, the next product was

introduced, beginning with the experimenter. No tokens or other visual prompts were used to indicate how many trials were remaining.

As with Duke, after each presentation, some form of social attention was delivered. The child was never forced to complete any step. If two or more types of negative responses occurred, the experimenter would stop and present an “easier” step. If only one type of negative response occurred, the experimenter remained on that step, if doing so seemed appropriate. If no negative responses occurred, then the experimenter moved on to the next step in the hierarchy. The experimenter stayed on a step for two or three more sessions if that step was particularly difficult or qualitatively different from the last step, or if the previous step had produced a lot negative responding. As with Duke, throughout all sessions, the experimenter made every attempt to make sessions fun for the child.

Additionally, generalization probes were conducted for Sam. During pretreatment the mother followed the same stimulus presentation as the experimenter. During treatment, the mother presented periodic steps within the exposure hierarchy. Finally during post treatment, the mother presented the criterion step in the same manner as the experimenter. This process was completed for all three skin care products. The mother did not complete the full training package that included all steps and models. She did, however, provide social attention those steps she probed and that Sam completed.

RESULTS

Interobserver agreement (IOA) on all measures related to Sam ranged between 75 and 100%. Baseline IOA for negative responses was 97%, positive responses 91%, and steps completed 100%. Scores for negative responses in all treatment sessions scored ranged between 75% to 100%. Scores for positive responses in all treatment sessions scored ranged between 86% and 100%. Steps completed for both conditions scored 100% in reliability. A complete summary of IOA is included in Table 1.

Duke. The results for Duke are presented in Figure 1. The top graph displays the progression of the hierarchy of steps. White boxes depict when a step was presented but not completed. Black boxes depict a step that was completed. An “X” depicts a step that was presented, dropped, and never returned to again. The graph below this displays the total number of negative verbal responses for each session. The data points appear at the beginning of each session.

Baseline was taken session one for the first two trials, during which the child cried and hid his hands and tried to run away. Treatment began in session one on trial three. In trial 4 a probe at criterion was conducted during which several negative responses were emitted. Trial six and seven were attempts at step 11. This step was too difficult for Duke. After the second attempt at this step (trial 7) step three was introduced because it was a smaller more easily tolerated step. The experimenter remained at step four (hand over hand prompting, child’s hand on experimenter’s, swirling lotion into a circle on the back of experimenter’s hand) for three trials (trials 9, 10, 11). This was done

for two reasons. The first reason was that in the previous trial, the jump to step 11 had been too big and he was not successful. It is important with graduated exposure that a history of successful contact with the stimuli be established. Furthermore, it was important that the procedures not be associated with aversive stimulation. The second reason was that during this step, it appeared that the child was having fun swirling the lotion and the experimenter determined that repeating this step would be beneficial.

Step five, trial 12 required putting lotion on the back of the child's hand and counting to three, then the experimenter wiped off the lotion with a tissue. This was the first successful direct skin contact with lotion. The experimenter remained at this step for three trials because it was felt that this was important in order to ensure it was a positive experience and let the child become successful with using lotion before the experimenter increased exposure. Therefore, the experimenter remained at this step for three trials.

Session two had a dropped step. Step 10, trials 16 and 17 (used a piece of tissue roughly 2 in square to wipe off lotion after counting to five) was dropped because it was too difficult, producing many negative responses during two presentations. The experimenter dropped down to step seven and ended the session there so that the child's last response was successful with an absence of negative responses.

Session three, trials 19 and 20 were probes conducted at criterion with several negative responses. Treatment resumed on trial 21 with step seven. No negative responses occurred. The experimenter ended the session there so that the child's last response was successful with an absence of negative responses.

Session four began with step eight. This step had more than one type of negative response, therefore, the experimenter returned to step seven. Step eight, was then presented again after step seven and the child did not emit any negative responses. Next was step nine, in which both “failed” presentations, involved only one type of negative response, so the experimenter stayed at this step. The third presentation was successful with no negative responses.

Session five, trial 28 began with step 11 which was one of the steps the child previously had trouble with. There were no negative responses, so the experimenter moved on. Session six, trial 32 continued where the previous session left off, with step 14. There were several negative responses so the experimenter returned to step 13. This step contained no negative responses and the experimenter could have moved back up to step 14 again, since there were no negative responses in step 13, but decided to move down one more to step 12. Step 12 involved the experimenter rubbing in lotion on the back of her own hand simultaneously with the child. This was an attempt to avoid moving too quickly and to capitalize on modeling. It appears as though step 14 was not revisited. This step involved putting lotion into the child’s hand. The steps subsequent to step 14 included this component, so the step was in fact tolerated within the steps that followed it in session 15.

Session seven started with step 15, which was a probe to check if the child would be able to handle a step that resembled step 14. Step 14 was similar to step 15 with the exception that not only did the child rub the lotion into his hands; he also applied it to his elbows, with the experimenter’s suggestion. The experimenter suggested applying lotion

to elbows after he tolerated rubbing it into his hands. No negative responding occurred from session seven on. The end result was accomplished in 43 trials during nine treatment sessions. Repeated posttests, five months later, show the results remained.

Sam. Figures 2, 3, and 4 display the results for Sam. Each upper graph displays the progression of the hierarchy of steps. Squares represent experimenter presentation of steps, and diamonds represent the mother's presentation of steps. White squares depict a step that was attempted but not completed. Black squares depict a step that was completed. An "X" depicts a step that was dropped and never returned to again. The middle graphs display the total number of positive verbal responses for each trial. The lowest graphs display the total number of negative verbal responses for each trial. For the two lower graphs, an open circle represents responses made with the mother conducting trials and a closed circle represents responses made with the experimenter conducting trials.

Suntan Lotion. Figure 2 displays the results for the first intervention with suntan lotion. Baseline was conducted in the first four sessions during which the child cried, threw each product when probed and tried to run away (session one was conducted in living room, and sessions 2-7 were conducted in the child's bedroom). Treatment began in session four. After step five the experimenter probed and attempted to go up to step 14. Step 14 consisted of putting lotion from the bottle onto the child's hand and counting to three before the experimenter wiped off the lotion with a tissue. More than one negative response occurred at this step, therefore the experimenter moved back to step 12 in which lotion was applied to child from experimenter's fingertip and wiped off with a tissue

immediately. After two trials with only one type of negative response, the third trial had more than one type of negative response. Therefore, the experimenter moved back to step six. The child did not emit any negative responses and to ensure he was able to maintain these results, the experimenter stayed for two trials. Steps 12 and 14 were never revisited again directly. The steps leading up to steps 12 and 14 made it such that when it came to those steps, he could go to a more difficult step.

By the end of session five and beginning of session six, Sam was applying lotion to himself and letting the experimenter apply it to him as well. Not only was he tolerating the application, but he was also smiling, laughing and touching the lotion. His positive responding increased in frequency, and on average, negative responding remained infrequent.

The experimenter remained at steps 21 and 22 from session six on because the child did not say “yes” when asked if he wanted suntan lotion. In spite of the fact that the child said “no” more than half the time, he still tolerated application of lotion accompanied by positive responding. It should be noted that all sessions from 2 to 6 were conducted in the child’s bedroom. Session seven probed for generalization outside by his pool. Session 8, 10, 11, and 17 were all the trials with suntan lotion that were conducted at his preschool. Sessions 9, 12-16, 18-20, and 23 were conducted at his home in the living room.

Sam’s mother participated in baseline during session one and two, one trial each session. For both trials her son emitted four and five negative responses, respectively, with no positive responses. Session seven, step 22 (apply lotion to child) was attempted

and Sam responded with seven negative responses and two positive responses. Session 16 was a session the mother conducted without the therapist being present. The videotaped session exhibited step 22 with no negative responses and nine positive responses. Treatment progressed in a steady manner, still trying to obtain a “yes” response from the child. There were no trials run for suntan lotion for sessions 21, 22, or 23. Post treatment was conducted one month after session 23. Results remained consistent with the last sessions of treatment conditions. The criterion step was not met and the child continued to respond with “no” to the question “do you want some lotion?” for all three attempts. Sam did not emit any negative responses and emitted one positive response for one trial of step 21

Antibiotic Cream. Figure 3 displays the results of the second product intervened on, antibiotic cream. Baseline was conducted in the first four sessions. Session one was conducted in the living room and the remaining baseline sessions were conducted in the child’s bedroom. Probes at criterion were conducted twice during session seven and twice during session eight. All baseline and criterion probes were accompanied by negative responding with no positive responding.

During session 14, after one more probe at criterion, treatment began at step 10 (child makes a circle with therapist’s finger on therapist’s hand). The child tolerated this step with only one negative response, which was accompanied by a positive response as well, so began treatment from there. During the second trial, Sam did not emit any negative responses. The next step presented was step 19 (child rubs in on the back of therapist’s hand). Again negative responding remained at only one incidence despite

large jumps in steps. The next step was step 20 (child rubs in on the back of his hand) and then 22 (apply elsewhere on body). During this session when the treatment conditions began, the child tolerated antibiotic cream being applied with very few occurrences of negative responses and several positive responses. Post treatment results were similar. No trials were run during session 16 or 19. It should be noted that sessions 14, 15, 18, 20, 21, 22, and 24 were conducted in the child's living room. Sessions 17 and 23 were conducted at his preschool.

Sam's mother applied antibiotic cream during session one and two under baseline conditions, one trial each session. Her son emitted six and three negative responses, respectively, with no positive responses. Session 22 his mother applied the product in the treatment condition in their living room. During step 21 Sam emitted two negative and five positive responses. During step 22 Sam did not emit any negative or positive responses.

Baby Lotion. Figure 4 shows Sam's responses to the third intervention, on baby lotion. After four sessions of baseline and probes taken at session seven, eight, and fourteen. Session one was conducted in the child's living room and session 2-4 (baseline conditions) were conducted in the child's bedroom. Baseline probes during session seven and eight were conducted in the child's living room, as well as all treatment conditions.

Treatment began in session 22, in the child's living room, when the experimenter asked the mother to probe step 21 (apply lotion to child on body). She then attempted step 22 (child apply lotion to self) during. No negative and several positive responses accompanied both steps. The experimenter chose to probe step 21 on the basis of the

similarity of this product to suntan lotion, which the child was tolerating. No trials were conducted in session 23. In session 24, post treatment, the child continued to successfully tolerate baby lotion.

Figures 5, 6 and 7 recombine the above information to allow comparison of products for Sam. The upper graph displays suntan lotion, the middle graph displays antibiotic cream, and the lower graph displays baby lotion. Figure 5 compares the progression of steps within the hierarchies for each product. Sessions 4-6 are strictly sessions where treatment for suntan lotion was conducted. Session seven and eight are sessions where not only treatment was conducted for suntan lotion, but probes were conducted for the other two products. Treatment progressed with suntan lotion to session 14 where treatment began for the antibiotic cream and a probe was conducted for baby lotion. Treatment progressed further for suntan lotion and antibiotic cream from session 14 to 22. Session 22 began treatment for baby lotion. Antibiotic cream was the only product used in session 23. Session 24 is post treatment.

Figure 6 compares the number positive responses for each product. The same format follows as with comparison of steps. Positive responding remains at zero with all products until intervened on, with the one exception of baby lotion, which had two positive responses during baseline. Positive responses were sometimes zero but there is an upward trend.

Figure 7 compares the number of negative responses for each product. The format is the same as the others. The highest negative response during baseline is six. The highest negative response during treatment is ten during suntan lotion, four during

antibiotic cream, and two during baby lotion. Although negative responding never drops out completely (due to saying “no” for criterion question) it remains relatively low, three or fewer after session 9 during suntan lotion treatment where the highest rate of negative response occurred.

Social Validity.

Both parents reported that the goal and method of this treatment was “very important” (5 points) and they were both “very satisfied” (5 points) with the method and outcome. They both reported that their children are now able to be outdoors without health risks because they are able to tolerate the application of suntan lotion, thereby reducing the threat of sunburn and skin damage.

Duke’s mother reported that acquiring this new skill allowed her son to experience new things. She stated that the frequency and intensity of tantrums associated with application of skin products have decreased, and that this has improved their relationship. As for suggestions she advises that future research could expand the variety of products to be tolerated, and the treatment could be extended to different settings.

Sam’s mother reported that her son’s time outdoors playing with friends or swimming, is no longer severely limited. His parents can now apply an antibiotic cream to scrapes, which until this treatment, were easily infected. She believes that, as a family, they will have more time to have fun instead of the parents “fighting with (Sam) over the protection he needs”. She had no suggestions for future improvements to the procedure. She added that the treatment never placed Sam in a situation that upset him and the

parents “saw very quick results” Copies of the original documents are included in Appendix E.

DISCUSSION

The results of this study show that graduated exposure used with modeling and contingent social attention can be used to teach tolerance of skin products for children like Duke and Sam. Not only did tolerance to these products increase, but positive responding increased and negative responding decreased. Results of this study support previous studies showing the usefulness of *in vivo* desensitization and similar treatments, including modeling to reduce fearful responding in children (King & Ollendick, 1997). As noted by O'Leary and Carr (1982) and Ollendick (1979), most of these studies have been with children who have fairly mild fears and anxieties. Love, Matson and West (1990) and Luscre and Center (1996) are two of the few studies that address fear in children with autism. Studies with empirical data attempting to address tactile defensiveness in children with autism are lacking. This study expands on that literature.

This study, like Love et al. (1990), used graduated exposure and modeling, and utilized mothers in the treatment process. Whereas those experimenters addressed one child's fear of running water in the bathroom and another child's fear of going outside, the present study addressed fear and intolerance of skin products. Although the fears were different, the procedures were similar and produced the same types of outcomes. Luscre and Center (1996) addressed fear of dental exams in children with autism using modeling and systematic desensitization, whereas in this study graduated exposure was used without the relaxation component included in systematic desensitization. The results, however, were similar.

The findings are important in the area of databased treatment of avoidance responses to tactile stimuli that have been demonstrated with children with autism. Interference with socialization, as well as health considerations, can be diminished for these children. If typical children at school include a child with autism in making mud pies, or going to an outdoor pool, the child with autism will be able to participate. Their avoidance responses will no longer separate them from other children. This study expands the literature on the treatment of avoidance behavior of children and offers a method of treatment that could potentially open new environments.

As a result of participation in new activities and environments, opportunities may develop to establish reinforcers. For example, making mud pies, going swimming outside, going on field trips, going for bike rides, and participating in a variety of other activities with peers are more likely to occur (Rosales-Ruiz & Baer, 1997). Avoidance of these situations will no longer interfere with daily functioning (King & Ollendick, 1997). Measurement, however, is necessary in order to demonstrate the relationship between the intervention and increases in activities related to the type of tactile stimuli. For example, will tolerating the application of sunscreen increase swimming participation? This study did not include measures of activity sampling and engagement outside of treatment. This might prove useful to demonstrate if, in fact, this type of training produces behavioral cusps.

This study deals with a common problem with children with autism. The fact that two children have responded positively to this treatment is encouraging but not

necessarily representative of the population. Further research can address the effectiveness of this procedure with other ages, genders, and disabilities.

There was one difficulty that occurred with Sam. After successful contact with the products, he continued to say “no” when presented with the question “do you want some lotion”, although his response was not accompanied by screaming, crying, or physical rejection. Further research needs to be conducted in the area of tactile defensiveness in relation to verbal behavior not corresponding to nonverbal behavior. The experimenter was making the assumption that if the child said “no” then he would not tolerate the products. In several instances, this was not the case. Sam, specifically, said “no” but did tolerate the application of the lotion.

It is more than possible that the children could have met criterion sooner if the criteria response was not posed as a question. Furthermore, it may have been more informative to have part of the final criterion involve actual application of the products. Therefore, it seems more appropriate to have had a different criterion. It is possible that the criterion probe was inappropriate. Moreover, even if Sam never said “yes” to any of these products, the experimenter believes the study would still be considered a success. Both children tolerated these products, and no longer have temper tantrums at the mere presence of them. The criterion question may have been better if posed as a statement “time to put on lotion” and the child tolerating the application. In regards to baseline conditions, further research may want to consider having the pretest condition be with application of lotion to all body parts.

Were these children avoiding the application of lotion or did the negative responding serve some other function? Conducting a functional analysis may have been helpful in identifying the function of the avoidance behaviors. In this case, the children responded well to the treatment package, so the usefulness of a functional analysis seems unnecessary. Also, at the onset of treatment, the children did not exhibit these behaviors in the presence of any other stimuli or other conditions. That is, they appeared to have appropriate responses to get attention and to escape demand situations. Furthermore, there are ethical concerns with using a functional analysis with this type of behavior. Repeated trials in the presence of a stimulus that provokes such extreme avoidance would be quite upsetting to the child, as well as their parents, and would quite closely resemble the technique referred to as “flooding”. On the other hand, conducting a functional analysis may be helpful in those cases where this type of procedure proves ineffective. It would also be helpful to collect data regarding other types of responses such as compliance to instructions, mands for attention, and mands to escape in order to identify the function of the responses.

For Duke, additional post tests were assessed three years later and his mother reported that he still had no problems with lotion or similar tactile stimuli. Sam had follow up a month later and still was tolerating the products. Long-term effects seem to be promising, even if the sample is small.

Uncontrolled variables are usually a difficult problem in applied settings. It is quite probable that not all important variables were controlled. In spite of this, in two different environments, with different variables in each, results were successful. The

variables that affected experimenter decision making were neither always clear nor systematically applied. The use of modeling varied as well. Sometimes it appears the experimenter changed procedures unsystematically. That is, it was not always clear why the experimenter changed or stayed on particular steps, other than clinical intuition. The most difficult aspect of this procedure was avoiding moving too quickly. Desensitization involves both response shaping and stimulus shaping. If the presentation of steps moves too quickly, the child is exposed to situations that have evoked fearful responses. The experimenter would then be stuck and not able to move forward. This is an area for future investigation and to standardize decision rules.

The cost to benefit ratio for this treatment is quite favorable. The risks to these children were very low. Safeguards and general concern for the children were ongoing. If at any time fearful responding was intense, the experimenter stopped what she was doing. In addition, much expensive professional time can be saved if parents, like Sam's mother, become active participants in their child's treatment. The benefits of this study far outweighed the costs.

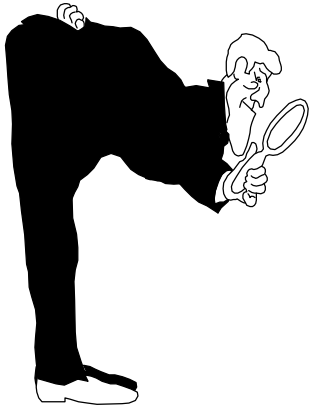
This study utilized a treatment package. Conducting a component analysis may be necessary to determine the contributions of each component of the package. It is not clear if all components of the package were necessary or whether any component would be effective by itself in producing these results. Graduated exposure may be necessary, but modeling and praise and access to preferred toys may also be necessary and may make the process more enjoyable for the child. Having a treatment that is not only effective, but also enjoyable is an important consideration (Van Dyck, & Spinhoven, 1997).

Likewise, satisfaction regarding the acceptability and importance of the intervention by caregivers is also essential (Wolf, 1978). Therefore, social validity was assessed. The social validity questionnaire provided feedback to the experimenter, as well as demonstrating attitudes of the parents regarding the methods. This study provided the parents with a way in which to reduce tantrums when their children are faced with similar situations.

Regardless of the variety of possible causes of these types of reactions to tactile stimuli, graduated exposure to the stimuli used with modeling and reinforcement can be an effective way of dealing with TD. This study further expands the treatment literature. Giving caregivers additional treatment options that may be less aversive than other treatments that, such as flooding, expose someone to the avoided situation at full criterion and remain in that situation for long periods of time without escape (King & Ollendick, 1997; Martin & Pear, 1992, p. 228). Improvement in children's behavior can eliminate barriers to their overall adjustment (Love et al., 1990). Social validity data suggests this was the case in the present study, but future research should address it further. The positive outcomes reported here should encourage further study of effective treatments of avoidance behavior frequently displayed by children with autism.

APPENDIX A

FEAT-NT NEWSLETTER ADVERTISEMENT



My name is Ellyn South and I am a Behavior Analysis graduate student at the University of North Texas. I am interested in working with children between the ages of 3 and 6, who have autism and show intolerance or protest in the presence of skin care products. I am conducting my thesis and am seeking children who cry, whine, push away, make a facial grimace or say something to show dislike to at least two of these products; lotion, sunscreen, first aide creams, liquid glue, finger paints, liquid soap, etc. My thesis will look at ways in which tolerance and acceptance for using these products can be increased, in addition to having the child use and respond to these products as their typical peers would. A faculty member from the Department of Behavior Analysis, Dr. Ala'i-Rosales will oversee this research. Participation is free of charge and is strictly on a voluntary basis, as well as being completely confidential. For more information, please contact me Monday-Friday 9-5 at (972) 672-6554. This research has been reviewed by the University of North Texas' Institutional Review Board (940) 566-3940.

APPENDIX B

INFORMED CONSENT FOR PARENTS OF CHILD

My name is Ellyn M. South and I am a Graduate Student of the University of North Texas. I am asking you and your child to participate in a study; the results will be used in research for a thesis in Behavior Analysis. Please read the following Informed Consent Form. A copy of this form will be made available to you for your records.

Parental Informed Consent Form

I/we, _____, agree to allow my child _____ to participate in a study of children diagnosed with autism that display intolerance or protest the application of skin care products. This study will benefit my child by teaching my child to tolerate skin care products that are beneficial. I understand that results are not guaranteed. This study will benefit society by helping researchers and clinicians to better treat children, with and without autism, who have similar responses to skin care products. I understand treatment will last approximately three (3) to six (6) months. Sessions will occur three (3) times a week lasting for approximately sixty (60) minutes each.

As the legal guardian(s) of a participant of this study, I understand that sessions will progress in the most comfortable way possible for my child and that no harm or risk is anticipated. Daily progress of my child will be expressed to me at the completion of every session. I also understand every session will be videotaped for the purpose of data collection and faculty supervision and for the protection of my child

I have been informed that any information obtained in this study will be coded with my child's corresponding number initials and if included in professional presentations or publications, the materials will only refer to my child as "Participant #". Under these conditions, I agree that any information obtained from this study may be used for publication or educational purposes. I understand that videotapes will be used for data collection and safeguard purposes and will be destroyed following the completion of this study. I understand that complete confidentiality will be maintained and that I have access to copies of the tapes at any time.

I further understand that the procedures used in this study pose no known physical, psychological, or social risks for my child now or in the future. My completion of the daily parent reports will assist in ensuring that my child is free from risk. I also understand that my child's participation is voluntary and that I may withdraw my consent and discontinue participation at any time without penalty.

If I have any questions or problems that arise in connection with my participation in this study, I should contact Ellyn South at (940) 565-2274 (Department of Behavior Analysis) or at (972) 434-6332 (Home) or Dr. Shahla Alai-Rosales at (940) 369-7454 (Department of Behavior Analysis).

Date

Date

Signature of Principal Investigator

Signature of Parent(s)

Parent's Phone Number

Signature of Faculty Advisor

This project has been reviewed and approved by the UNT Human Subjects Review Board, (940)-565-3940.

APPENDIX C

OBSERVATION PROTOCOL

(OBSERVATION CODE, SCORING RULES AND DATA SHEETS)

OBSERVATION CODES AND SCORING RULES

The sessions take place in the child's home, in a bedroom or playroom. The sessions are videotaped with the camera in the least intrusive place (e.g. in the corner of the playroom) yet close enough to pick up sound and picture. The therapist records the child's responses on data sheet after the session, but before the subsequent session. Event data will be recorded throughout every trial during every session.

Definitions:

Step: The goal or terminal behavior involves the child's voluntary engagement with the product (rubbing in and leaving on) for at least 5 to 10 seconds. To reach this goal, the task is broken down into discrete actions and/or units of time leading to the terminal response. A step is any attempt at the final desired outcome regarding the stimuli avoided. The therapist will present a step to the child. Only those attempts at the final desired outcome will be counted as a step. Sample steps for lotion may include:

1. Child holds bottle
2. Child applies lotion to therapist, hand over hand
3. Dab of lotion on back of child's hand, wait 3 s, therapist wipes off with tissue
4. Dab of lotion on back of child's hand, wait 5 s, child wipes off with tissue
5. Dab of lotion on back of child's hand, wait 5 s, child wipes off, with 1 inch removed with tissue
6. Dab of lotion on back of child's hand, wait 10 s, child wipes off, with 2 inches removed with tissue

7. Child and therapist rub in lotion simultaneously
 8. Dab on back of child's hand and child rubs in lotion independently
 9. Dab on palm of child's hand and child rubs in lotion independently
 10. Therapist gives choice of back of hand or palm to apply lotion to the child
 11. Imitates therapist rubbing into palms and elbows
 12. Therapist applies lotion then child applies and rubs in independently
 13. Child applies lotion to therapist and then himself and rubs in on himself
 14. Therapist gives bottle to child and the child applies and rubs in hands and elbows with the instruction "You put it on by yourself"
 15. Child applies and rubs in with the instruction "You do it"
 16. Apply to palms and elbows, therapist gave instruction, "Now put it on your knees"
 17. Apply to palms, elbows and knees, therapist gave instruction, "Now put it on your cheeks"
 18. Apply to palms, elbows, knees and cheeks, sibling suggests "Neck"
 19. Therapist, child and sibling move to the bathroom to apply lotion
- Criterion: Therapist asks child "Do you want some lotion?"

Exclusions:

Any attempt at any activity that is not directly related to the avoided stimuli. These include activities such as; doing puzzles, eating snacks, writing their name, and so on.

Scoring Rules:

At each presentation of a step, the step is scored according to the child's response. A "+" is scored if the child completes a step without any negative facial grimaces, verbal, vocal or physical responses. If a "+" is scored the next step may be introduced.

A "-" is scored if there are any negative facial grimaces, verbal, vocal or physical responses. The therapist may remain on that step if the child has only one of these responses during a particular trial. If there are two or more types of negative responses at any given trial (e.g. crying and pushing bottle away), the therapist will then find a smaller, more easily tolerated step within the sequence.

The therapist records, using tallies, the number of negative and positive responses, as well as recording if there were no explicit negative or positive responses observed. If there were no explicit negative or positive responses observed, the therapist may stay at that trial one or more times or move forward to the next logical step, depending on the child's previous responding. If the child cried during the previous trial the therapist may decide to do a few more trials to ensure progression isn't going too quickly. If the child laughed during the previous trial, the therapist may conclude steps are moving along at an appropriate pace. Negative and positive verbal, vocal, facial grimaces, and physical responses are defined below.

Child's Responses:

- Verbal responses include words and phrases signed, or spoken by the child. Included are pictures or symbolic communication systems. Included are negative and positive responses related to the treatment procedure. The context or meaning of the phrase will be counted. For example, “Stop it” would be recorded as 1 tick mark. “No! Stop! I don’t like it!” would be recorded as 3 tick marks, and “I like this stuff” would be recorded as 1 tick mark. The tone of what is said may influence how it is scored. “Hey” while laughing will be scored differently than “hey” when crying.

Negative: Any words or phrases expressing dislike including tone of voice.

Examples: “I don’t like this”, “No”, “Don’t”, “This feels yucky”, “I hate lotion”.

If the child is whining and says an otherwise neutral comment like; “This is cold!”, it will be recorded as a negative verbal response.

Positive: Any words or phrases expressing comfort, acceptance, or enjoyment.

Examples: “This is fun”, “Cool”, and “Watch this”, and “Can I have some lotion?” If the child is laughing and says an otherwise neutral comment like; “This is cold!”, it will be recorded as a positive verbal response.

Exclusions: Verbal responses not related to the treatment procedure. Some examples may include “I love my new bike”, or “I hate school”.

- Vocal responses include noise or tone of statements made with the mouth. Included are negative and positive responses related to the treatment procedure.

Negative: Any sound expressing dislike, or a tone that is louder than speaking voice with a high-pitched tone.

Examples: Whining, crying, “blaa”, whining while speaking

Positive: Any sound expressing comfort, acceptance, or enjoyment.

Examples: Laughing, “m-m-m”, and “oo-oo-oo”, “Woo-who”

Exclusions: Coughing, sneezing, or vocal self-stimulatory sounds (ee-ee-ee-ee)

- Facial grimaces include expression or movement of facial muscles. Included are negative and positive responses related to the treatment procedure.

Negative: Any movement or expression of facial muscles expressing dislike.

Examples: Scrunching up nose, closing eyes, sticking out tongue, pouting

Positive: Any movement or expression of facial muscles expressing comfort, acceptance, or enjoyment.

Examples: Smiling, eyebrows raised, winking

Exclusions: Facial ticks, itch movement or self-stimulatory facial movements (quick blinking, squinting)

- Other physical responses include bodily movement by the child, not included in the step requirements. Included are negative and positive responses related to the treatment procedure.

Negative: Any movement expressing dislike.

Examples: Pushing or moving away from the stimuli, shaking head “no”.

Positive: Any movement expressing comfort, acceptance, or enjoyment.

Examples: Taking stimuli, moving towards stimuli, touching stimuli, shaking head “yes”.

Exclusions: Sitting in chair, tapping table, or physical self-stimulatory

movements (rocking, hand flapping)

- “No” would indicate that none of the above responses were observed.

See below for example data records.

	—									
	1	2	3	4	5	6	7	8	9	10
Ver-										
Voc-										
Phy-										
Gim-										
Ver+										
Voc+										
Phy+										
Gim+										
Nb										

- Trial 1 included 3 negative verbal responses (“No, no lotion, yuck, I don’t want it”) and 1 negative physical response (push away bottle).

⇒ This step will be discontinued and be broken down into a smaller and less difficult step.

	+	—								
	1	2	3	4	5	6	7	8	9	10
Ver-										
Voc-										
Phy-										
Gim -										
Ver+										
Voc+										
Phy+										
Gim+										

- Trial 1 includes no explicitly positive or negative responses.
- Trial 2 includes 4 negative verbal responses (“don’t”, “yuck!”, “it’s gross, stop”) and 1 negative physical response (hide hands behind back).

⇒ This step will be discontinued and be broken down into a smaller and less difficult step.

	—									
	1	2	3	4	5	6	7	8	9	10
Ver-										
Voc-										
Phy-										
Grim-										
Ver+										
Voc+										
Phy+										
Grim+										
No										

- Trial 1 includes 1 negative verbal response (“No tummy”) and 1 negative physical (turns body away from therapist)

⇒ This step will be discontinued and be broken down into a smaller and less difficult step.

	+									
	1	2	3	4	5	6	7	8	9	10
Ver-										
Voc-										
Phy-										
Grim-										
Ver+										
Voc+										
Phy+										
Grim+										
No										

- Trial 1 includes 2 positive verbal responses (“This smells like flowers”, “It’s soft”) and 1 positive grimace (smile) with 1 positive vocal response (a laugh).

⇒ The next step will now be introduced.

	—	—	+	+						
	1	2	3	4	5	6	7	8	9	10
Ver-										
Voc-										
Phy-										
Grim-										
Ver+										
Voc+										
Phy+										
Grim+										
No										

- Trial 1 includes 1 negative facial grimace (stuck tongue out).
- Trial 2 includes 1 negative physical response (puts hands behind back).
- Trial 3 includes no explicitly positive or negative responses.
- Trial 4 includes 1 positive verbal response (“soft”) and 1 positive vocal response (giggle).

⇒ The next step will now be introduced.

Data Sheet for Duke:

Description

Step #

1	2	3	4	5	6	7	8	9	10

										Verb									
										Whine									
										Grm									

Comments:

Description

Step #

1	2	3	4	5	6	7	8	9	10

										Verb									
										Whine									
										Grm									

Comments:

Description

Step #

1	2	3	4	5	6	7	8	9	10

										Verb									
										Whine									
										Grm									

Comments:

Description

Step #

1	2	3	4	5	6	7	8	9	10

										Verb									
										Whine									
										Grm									

Comments:

Data Sheet for Sam:

Description _____

Step #

1	2	3	4	5	6	7	8	9	10	

Comments

Description _____

Step #

1	2	3	4	5	6	7	8	9	10	

Comments

Description _____

Step #

1	2	3	4	5	6	7	8	9	10	

Comments

Description _____

Step #

1	2	3	4	5	6	7	8	9	10	

Comments

APPENDIX D
HIERARCHY OF STEPS

HIERARCHY OF STEPS FOR DUKE

Dry skin lotion:

1. Hold bottle of lotion
 2. Child puts lotion in therapist's palm
 3. Child puts lotion on therapist's nose using therapist's finger
 4. Child puts swirls lotion on back of therapist's hand using therapist's finger
 5. Dab of lotion on back of child's hand, count to 3 therapist wipes off with tissue
 6. Dab of lotion on back of child's hand, count to 5 child wipes off with tissue
 7. Dab of lotion on back of child's hand, count to 5, child wipes off with 1 inch off of tissue
 8. Used old tissue from step #7 (some lotion already on tissue)
 9. Dab of lotion on back of child's hand, count to 10, child wipes off with 1/2 of tissue
 10. Dab of lotion on back of child's hand, count to 5, child wipes off with very small piece of tissue (TOO BIG, STEP DROPPED)
 11. Touch product
 12. Very small dab on hand of child and on therapist, with therapist's instruction "rub it in" both rubbed lotion into hands simultaneously
 13. Dab of lotion on back of child's hand, therapist states "uh-oh, no tissues, rub it in make it go away like magic"
 14. ...then in palm
 15. ...palm and elbow
 16. Child applied lotion to himself
 17. Therapist instructs "you do it all by yourself, do elbows too"
 18. ...knees, elbows and cheeks
 19. ...knees, elbows, cheeks and neck
 20. Generalize lotion application to bathroom where application of lotion typically occurs
- Criterion "Do you want some (lotion)?"

HIERARCHY OF STEPS FOR SAM

Suntan lotion, antibiotic cream, and baby lotion:

(Settings included bedroom unless otherwise noted.)

1. Look at and touch bottle
 2. Smell product with cap off bottle
 3. Pick up off floor, give to therapist
 4. Hold bottle 5 s
 5. Hold bottle 15 sec
 6. Dab on back of therapist's hand, child wiped off with tissue
 7. Child wiped off therapist's nose with tissue
 8. Child pushed therapist's hand to therapist's nose, with product on therapist's index finger, and wiped off with tissue
 9. Child pushed therapist's hand to therapist's nose, with product on therapist's index finger, and wiped off with tissue (as in previous step) and puts product back of therapist's hand and wiped off with tissue
 10. Rubbed product into therapist's hand with finger of therapist's other hand, with child manipulating therapist's hand
 11. Pretended to do previous step (rubbed product into therapist's hand with finger of therapist's other hand, with child manipulating therapist's hand), therapist "accidentally" got product on child, therapist wiped off immediately with a tissue
 12. Therapists applied dab of product from therapist's finger, on back of child's hand, wiped off immediately with a tissue
 13. Therapists applied dab of product from therapist's finger, on back of child's hand, counted to 3 out loud, wiped off with a tissue
 14. FROM BOTTLE, PUT DAB ON BACK OF CHILD'S HAND, COUNTED TO 3, WIPED IMMEDIATELY (STEP DROPPED)
 15. Therapists applied dab of product from therapist's finger, on back of child's hand, counted to 5 out loud, wiped off with a tissue
 16. Therapists applied dab of product from bottle onto back of child's hand, counted to 5 out loud, wiped off with a tissue
 17. Therapists applied dab of product from bottle onto back of child's hand, counted to 10 out loud, wiped off with a tissue
 18. Pretended to do previous step (dab of product from bottle onto back of child's hand, counted to 10 out loud, wiped off with a tissue), when therapist got to "10", said "uh-oh, no more tissues. Rub it in."
 19. Child applied product to therapist in one of three possible settings*
 20. Child rubbed in product, on hands, without any counting in one of three possible settings*
 21. Child applied to own body in one of three possible settings*
 22. Therapist applied to child's body in one of three possible settings*
- Criterion: "Do you want some (product)?" in one of three possible settings*

* One of three settings included living room, outside, or school

APPENDIX E
SOCIAL VALIDITY QUESTIONNAIRE

SOCIAL VALIDITY QUESTIONNAIRE

Skin Care Product Intervention

Please answer according to your opinion. Circle your response.
(Parent's responses were highlighted in gray by experimenter)

- | | | | | |
|--|----------------|---|---|---------------|
| | important | | | not important |
| 1. How important was the goal of this treatment? | 1 | 2 | 3 | 4 5 |
| 2. How important was the method of this treatment? | 1 | 2 | 3 | 4 5 |
| | very satisfied | | | not satisfied |
| 3. How satisfied are you with the method? | 1 | 2 | 3 | 4 5 |
| 4. How satisfied are you with the outcome? | 1 | 2 | 3 | 4 5 |

Please write your responses to the questions below, in your own words. Feel free to use the back or another piece of paper for your responses.

5. What does it mean for your child to have acquired this new skill?

“This new skill has allowed my child to experience new things – activities, textures, and foods. He is able to withstand the application of sunscreen so he can enjoy the outdoors. He tolerates different types of material on his skin, therefore expanding his choice of clothing items. He is more courageous with food-he will at least try even if it is a food that he later rejects.”

6. What does it mean for you and your family to have acquired this new skill?

“It means less tantrum and less stressful tantrums. It means a more diversified lifestyle. It means a better relationship with our child.”

7. Please make suggestions on ways in which to improve these procedures.

“One could try to expand the variety of products to be tolerated, still in a very controlled manner but across different settings. (Master lotion, move onto antibiotic ointment, or powder etc.)”

SOCIAL VALIDITY QUESTIONNAIRE
Skin Care Product Intervention

Please answer according to your opinion. Circle your response.
(Parent's responses were highlighted in gray by experimenter)

- | | important | | | | not important |
|--|----------------|---|---|---|---------------|
| 1. How important was the goal of this treatment? | <u>1</u> | 2 | 3 | 4 | 5 |
| 2. How important was the method of this treatment? | <u>1</u> | 2 | 3 | 4 | 5 |
| | | | | | |
| | very satisfied | | | | not satisfied |
| 3. How satisfied are you with the method? | <u>1</u> | 2 | 3 | 4 | 5 |
| 4. How satisfied are you with the outcome? | <u>1</u> | 2 | 3 | 4 | 5 |

Please write your responses to the questions below, in your own words. Feel free to use the back or another piece of paper for your responses.

5. What does it mean for your child to have acquired this new skill?

“(My child’s) health issue was a great concern to us. He is in the sun constantly during the summer, and now we do not need to worry about skin care issues. It will not limit his time outdoors with friends or swimming... which he loves. We can also doctor any scrapes or wounds he has now. Until this point, we have been having a very hard time keeping even minor scrapes from becoming infected.”

6. What does it mean for you and your family to have acquired this new skill?

“We will have so much more time to have fun together instead of fighting with (our child) over the protection he so greatly needs. I feel we have taken huge steps toward (our child) leading a more ‘typical’ childhood. That gives me great joy!”

7. Please make suggestions on ways in which to improve these procedures.

“I really can’t think of a way to improve the process. (Our child) was never placed in a situation that upset him, and we saw very quick results.”

APPENDIX F

EXAMPLE OF TYPICAL TRAINING SESSION

EXAMPLE OF TYPICAL TRAINING SESSION

- A. Therapist arrives
 - 1. Therapist speaks with parent
 - 2. Therapist gathers materials
- B. Play high preferred activity with child
- C. Desensitization trial begin (video camera turned on)
 - 1. Therapist takes out bottle of lotion and asks the child if he wants some
 - 2. The child hides his hands and shakes his head (this step is broken down)
 - 3. Therapist puts the bottle on the table next to the child and talks about its funny shape
 - 4. The child makes a comment and the therapist tickles the child (this is fun for him) and moves the bottle closer (this is another next step)
 - 5. The child decides to pick up the bottle to show the therapist something on the bottle (this is another next step)
 - 6. The therapist tickles the child and says “Ya’, that’s cool!” can I hold it? (modeling)
 - 7. The therapist looks at the bottle and finds something else interesting on it and offers the child the bottle again
 - 8. The child takes the bottle and the therapist tickles the child again and the therapist tries to make the bottle stand upside down (modeling)
 - 9. The child takes the bottle and tries to make it stand upside down (the child has now mastered a step and the therapist will progress to another step)
 - 10. Video camera turned off
- D. Play high preferred activity with child
- E. Desensitization trial begin (video camera turned on)
 - 1. Therapist takes out bottle of lotion and asks the child if he wants some
 - 2. The child hides his hands and shakes his head (here this step will be broken down again)
 - 3. The therapist opens the bottle and applies it to herself and says “This stuff smells like suntan lotion, mmmm” (modeling)
 - 4. Therapist asks again if the child would like to try lotion
 - 5. The child hides his hands and shakes his head (step is still too difficult)
 - 6. The therapist puts a dot of lotion on the back of her hand and the child takes her other hand and swirls the therapist’s finger in it and they laugh at the design it made (modeling and new step)
 - 7. The therapist puts another dot of lotion on the back of her hand and the child takes her other hand and swirls the therapist’s finger in it and the child tries to make another shape on the therapist’s hand. They laugh at the design it made (modeling)
 - 8. The therapist puts another dot of lotion on the back of her hand and the child takes her other hand and swirls the therapist’s finger in it and the child tries to make another shape on the therapist’s hand. The therapist tells the child to keep swirling it until it disappears. “Cool, it’s like magic!” (The child has now mastered a step and the therapist will progress to another step)
 - 9. Video camera turned off
- F. Play high preferred activity with child and says good-bye to the child
- G. Therapist meets with parent for a few minutes and leaves

APPENDIX G

TABLES

Table 1.
Interobserver Agreement for Sam

Condition	Baseline	Treatment	Treatment	Treatment	Treatment	Treatment	Treatment
Session	1	15	17	16	19	20	22
Positive Responses	91%	98%	86%	100%	83%	75%	96%
Negative Responses	91%	98%	86%	100%	92%	100%	96%
Steps Completed	100%	100%	100%	100%	100%	100%	100%

APPENDIX H
FIGURES

Figure 1. Duke’s progression of steps with negative responses below.

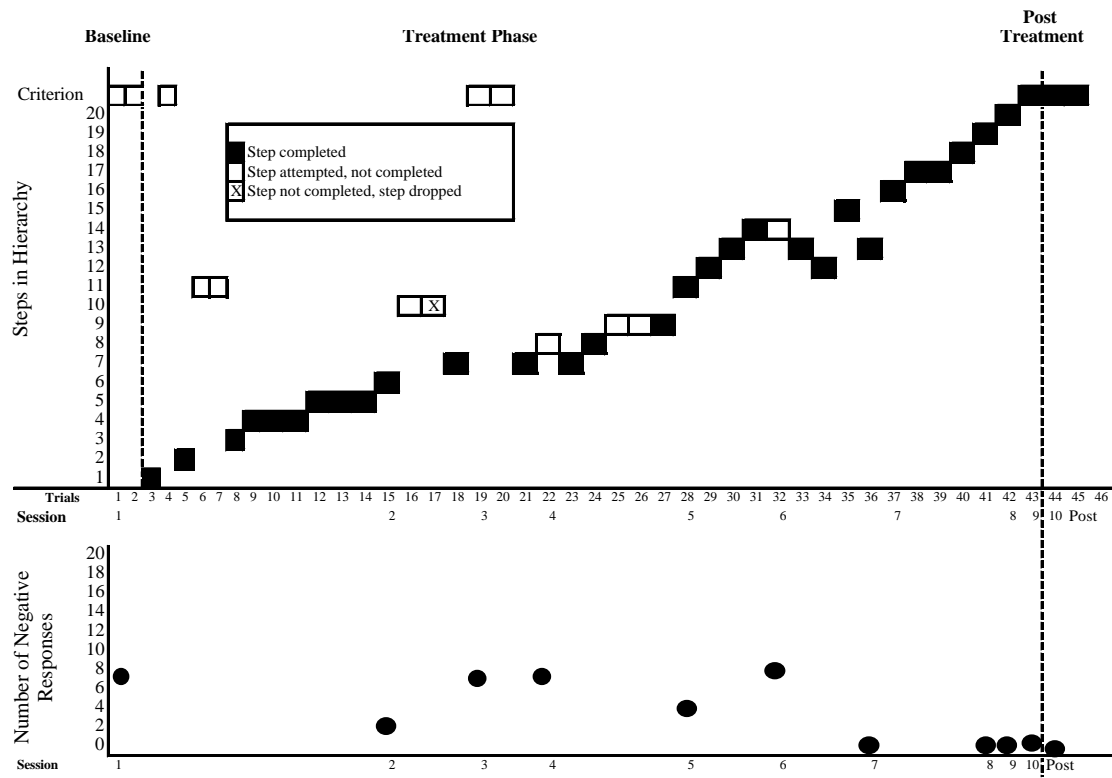


Figure 2. Sam's progression of steps in hierarchy for suntan lotion with number of positive and negative responses below.

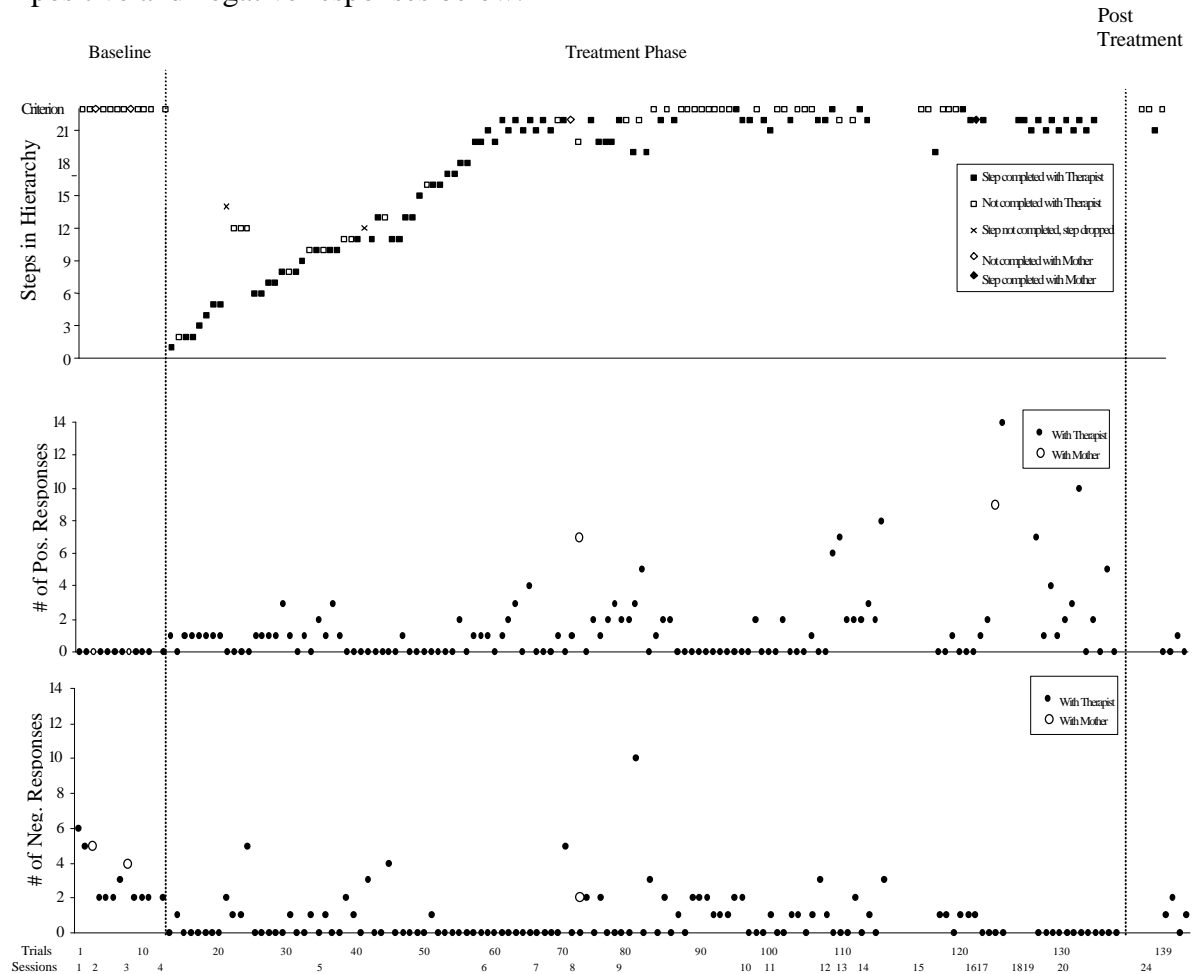


Figure 3. Sam's progression of steps for antibiotic cream with positive and negative responses below.

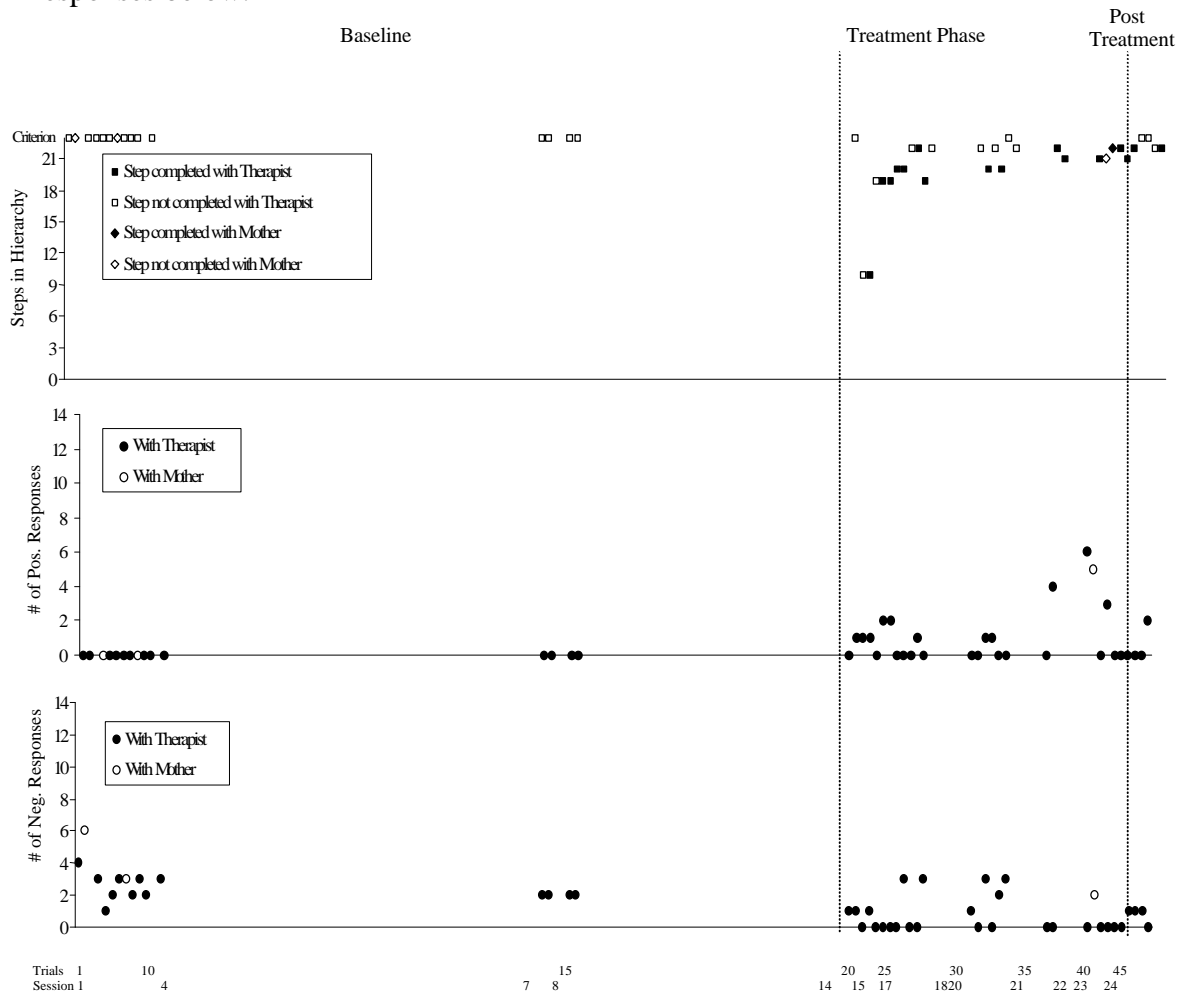


Figure 4. Sam's progression of steps for baby lotion with positive and negative responses below.

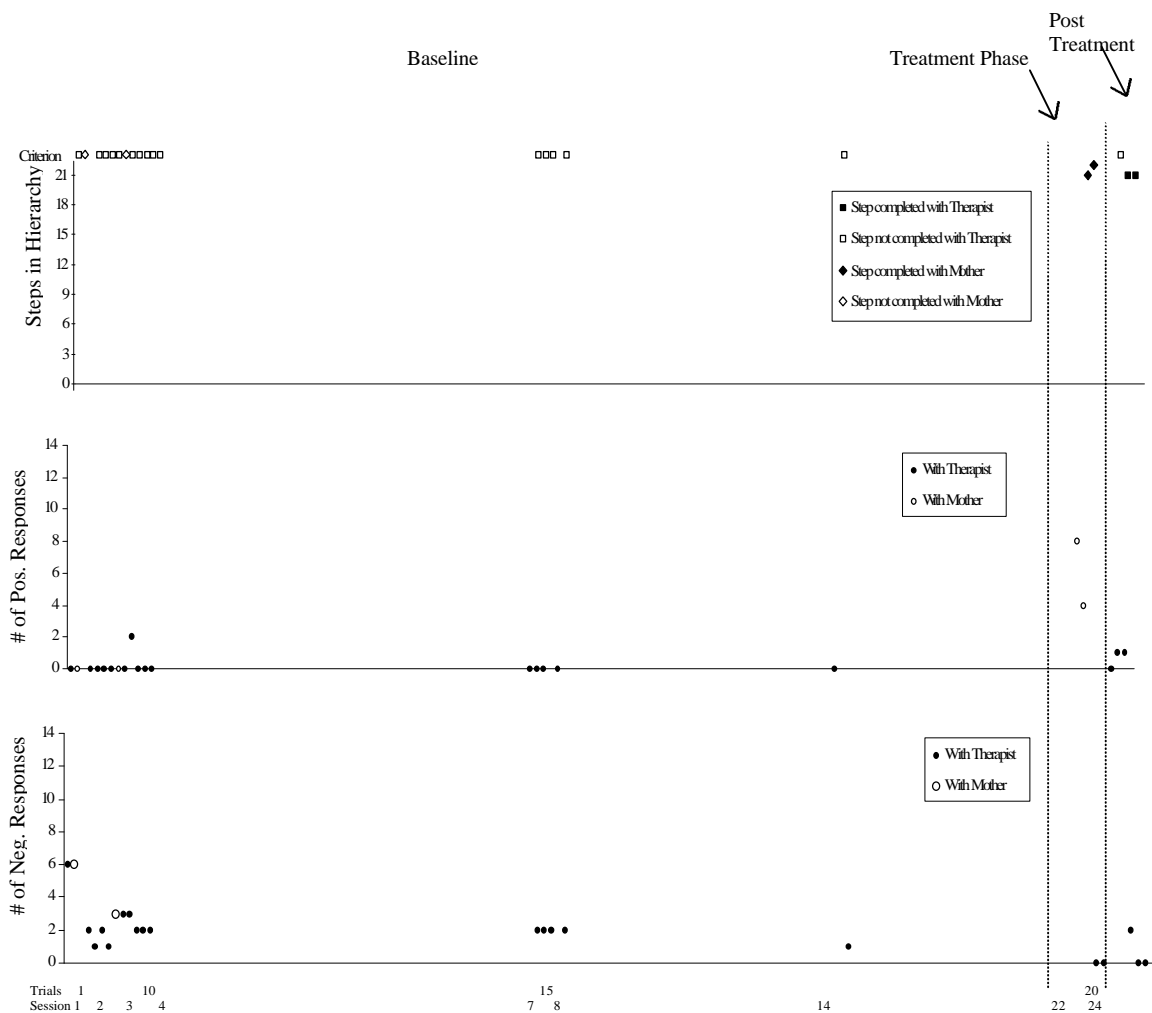


Figure 5. Comparison of steps with each product for Sam.

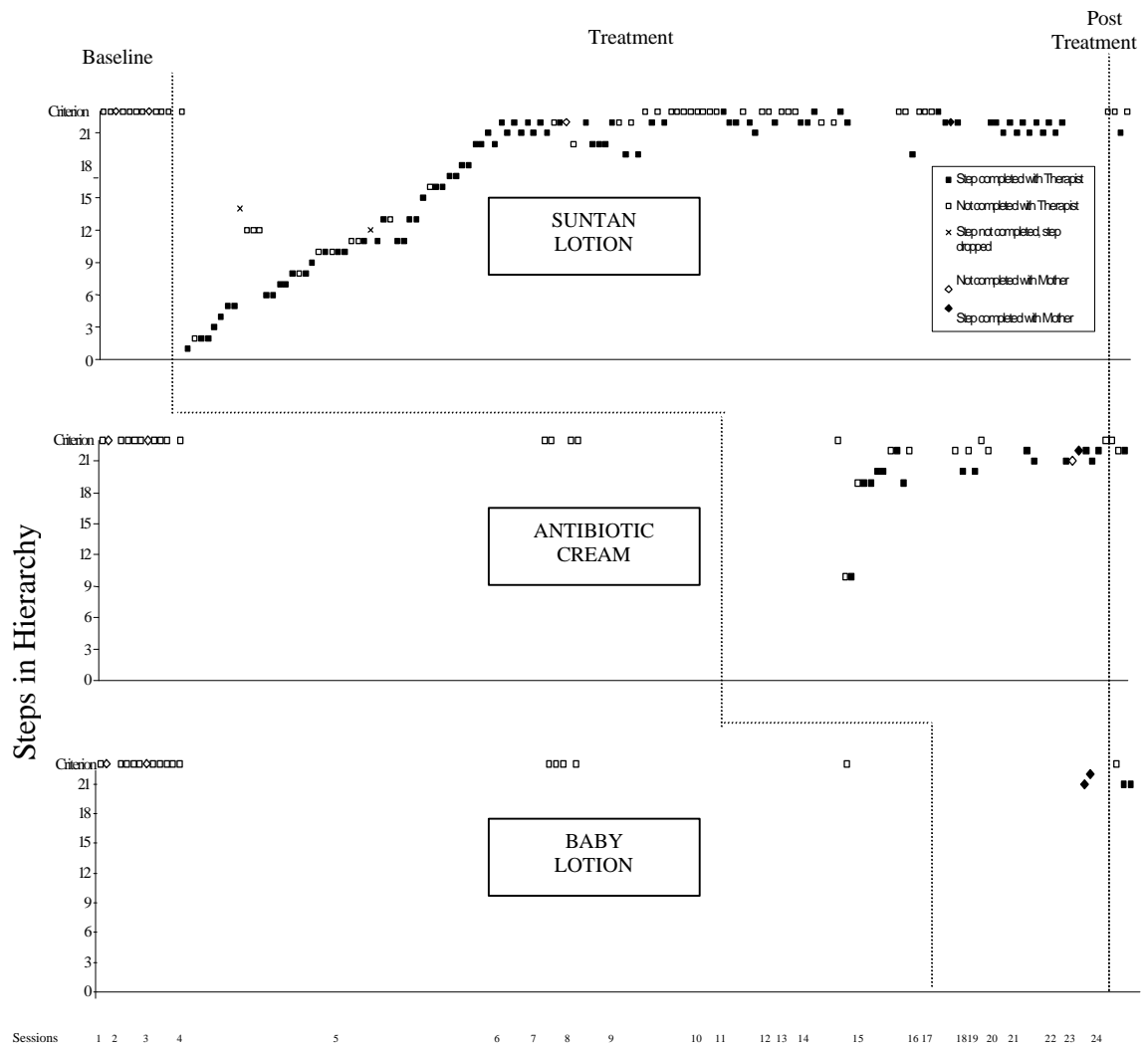


Figure 6. Comparison of positive responses with each product for Sam.

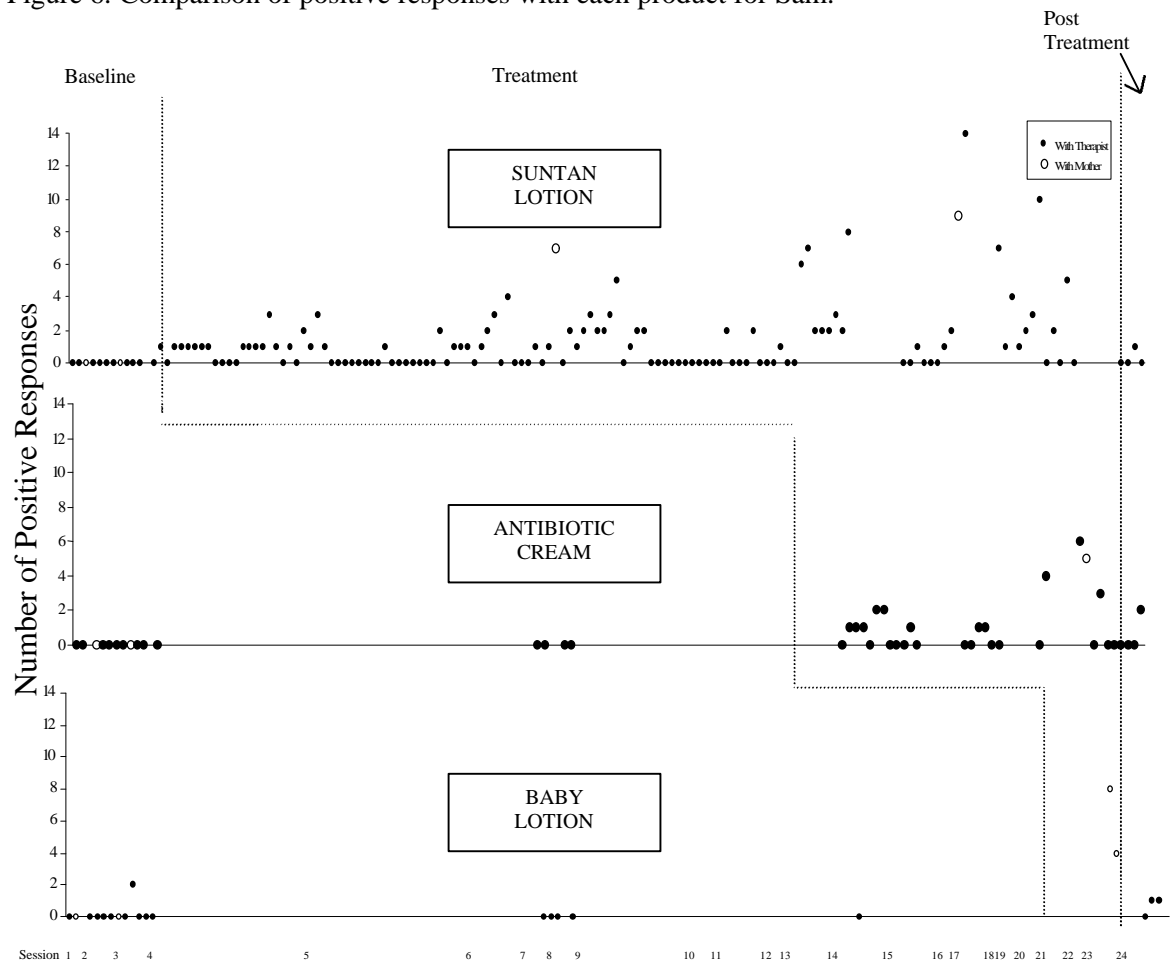
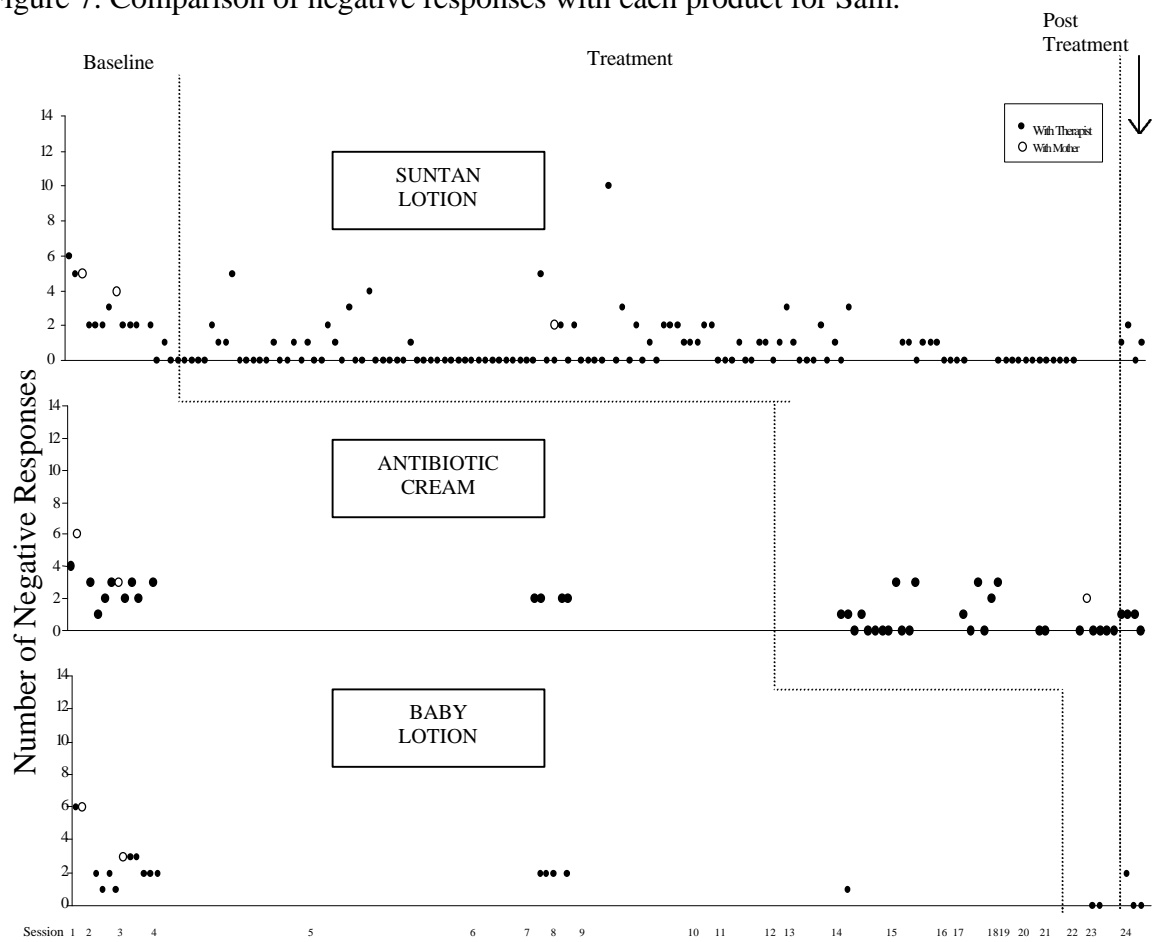


Figure 7. Comparison of negative responses with each product for Sam.



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